

**BIOLOGICAL NOTES AND DESCRIPTIONS OF THE IMMATURE
STAGES OF *PELASTONEURUS VAGANS* LOEW
(DIPTERA: DOLICHOPODIDAE)¹**

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Abstract.—*Pelastoneurus vagans* Loew is the most widespread species of its genus in North America. The immature stages inhabit mud substrates in a variety of aquatic and semiaquatic situations. Adults and larvae were collected from freshet seeps and mud flats in east-central Washington. The preferred habitats, third larval instar, larval mouthparts, pupa, and pupal cocoon are described and illustrated using line drawings and photographs.

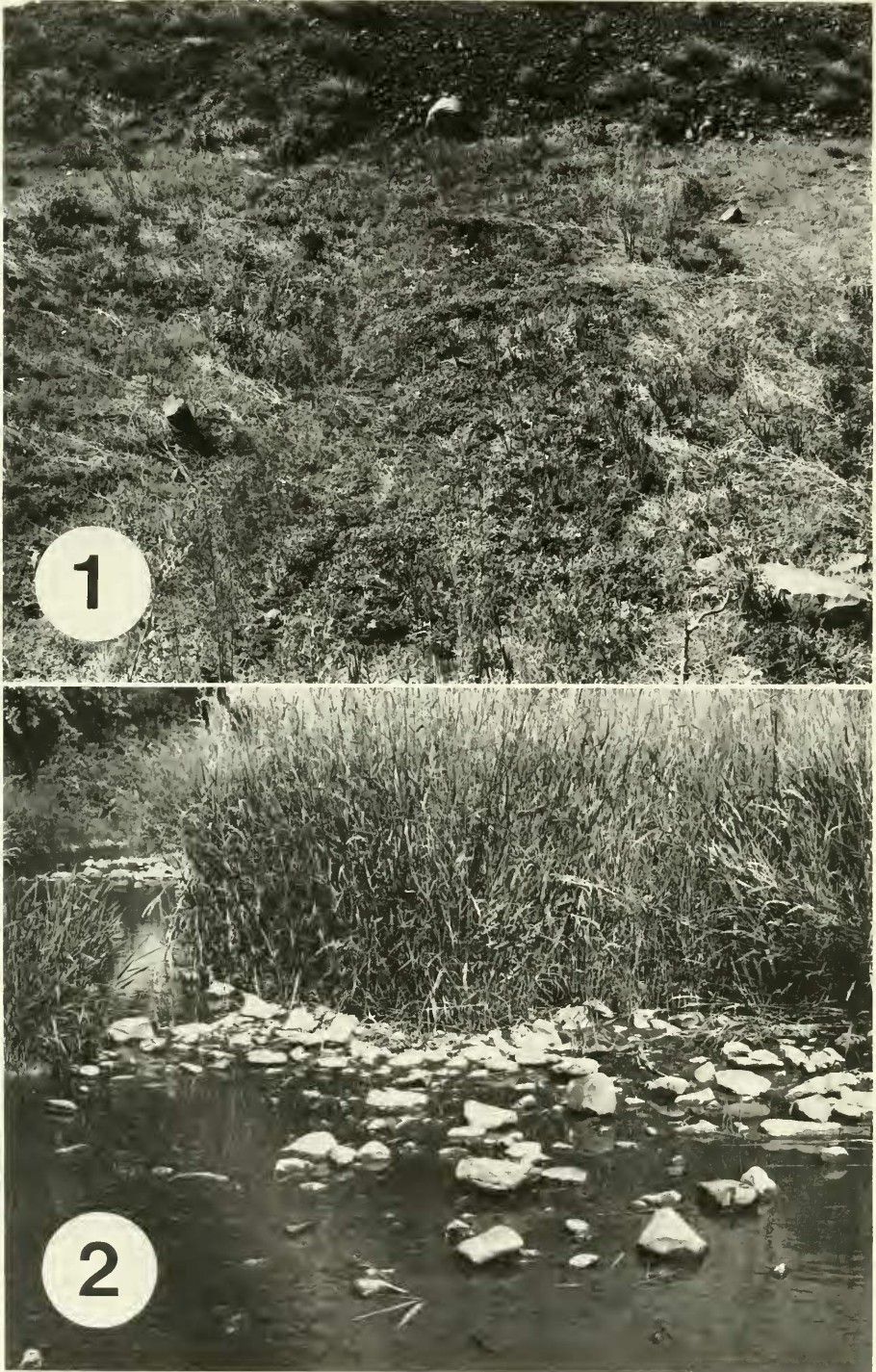
The Dolichopodidae represent an integral part of the insect fauna occupying many aquatic and semiaquatic habitats in North America. This study (Corpus, 1983) was an attempt to collect and identify the immature stages of some of the dolichopodids which frequent the freshwater seepages along the canyon walls of the Snake River and various mud flats in east-central Washington.

One of the most prevalent dolichopodids in these sites is *Pelastoneurus vagans* Loew, which has also been collected from roadside drainage ditches and waterfalls (Corpus, 1983). *Pelastoneurus* is represented by 29 Nearctic species, *P. vagans* being the most widespread (Foote et al., 1965). At present little biological information is available for any member of the genus.

MATERIALS AND METHODS

Several larval breeding sites of *P. vagans* were located after intensive surveys of the region revealed where adults occurred. Adults and larvae were collected from two sites in Whitman County in eastern Washington; Crum 4696, a seepage site 37.9 km SW of Pullman (Fig. 1), and Union Flat Creek at Klemgard County Park, 20.3 km W of Pullman (Fig. 2). Larvae of *P. vagans* were collected periodically throughout 1981 and 1982, beginning in late March and continuing into late August. To acquire larvae, substrate samples from both sites were collected and sieved through a series of Tyler standard testing sieves, numbers 8, 14, 20, and 35. Sieved soil from each screen was submerged in saline solution (150 mg NaCl/liter H₂O), causing the larvae to become active and float. Extracted larvae were rinsed in distilled water. Measurements of larvae and morphological struc-

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Figs. 1, 2. Typical habitats of *Pelastoneurus vagans*. 1, Crum 4696. 2, Union Flat Creek.

tures were made using an ocular micrometer in a dissecting microscope. In addition to measurements, observations were also made of active larvae in the laboratory.

Larvae to be used for identification were placed into Kahle's solution for 12 hours and then transferred to 70% ethanol. For subsequent analysis, larvae were later cleared in 10% KOH. Live larvae were placed into petri dishes of freshly screened mud for subsequent development to adults. All larvae extracted for rearing during each period were placed in a common petri dish. Each petri dish thus corresponded to a separate sampling period. Chironomid larvae extracted from other samples were added as prey, and each rearing dish placed under a 16L:8D photoperiod regime. Seventy-four rearing dishes were set up in this manner, 44 with specimens taken at Crum 4696 and 30 from Union Flat Creek. Dishes were checked daily. Newly emerged adults were aspirated, identified, and pinned. Intact pupae and pupal exuviae were placed into 70% ethanol. Pupal cocoons were removed, air dried, and sprayed with hair spray to retain their structure for later description. Descriptions and terminologies follow those of Dyte (1967), Beaver (1966), and Smith (1952).

LIFE HISTORY OBSERVATIONS

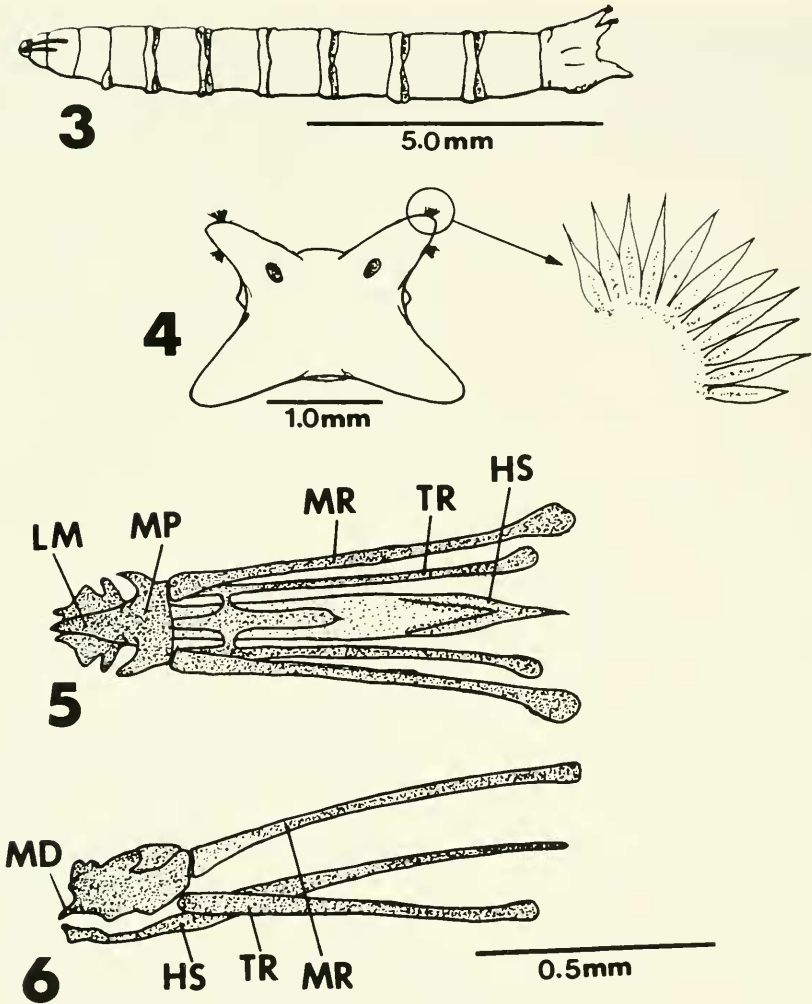
The developmental period from first larval instar to adult for *P. vagans* was 22–30 days ($n = 10$; $\bar{x} = 24$). Larvae remained within the mud media throughout their development. Developmental periods for pupae varied from 4–7 days ($n = 8$; $\bar{x} = 6$). Pupae could be detected in the rearing dishes by viewing the mud under the dissecting microscope to locate respiratory horns of the cocoons protruding 1–2 cm above the mud surface. When touched, these horn tips would move in a scissoring fashion, and on one occasion were drawn beneath the mud surface, presumably back into the cocoon. On occasion, more than one pupa was found and extracted from the same vicinity in a rearing dish, suggesting that pupae may share cocoon sides when adjacent to one another, and that larvae may have site preferences in which to pupate. Pupal exuviae were always found plugging the cocoon exit holes, indicating that adults always emerged at the surface of the mud directly above their pupal cocoons.

Newly emerged adults were never observed feeding in the laboratory, although they regularly imbibed water from the mud surface. Adult longevity, under laboratory conditions, was 3–5 days ($n = 8$; $\bar{x} = 4.1$). During the extraction process, several unidentified species of other dipteran larvae were collected including tipulids, ephydriids, and chironomids. During surveys at the two field sites several other dolichopodid species were collected, including *Tachytrechus auratus* (Aldrich), *T. olympiae* (Aldrich), *Rhaphium pollex* (Van Duzee), *Chrysotus arcuatus* Van Duzee, *C. argentatus* Van Duzee, and *Syntormon tricoloripes* Curran.

DESCRIPTIONS OF IMMATURE STAGES

Egg.—Length 0.6–0.7 mm; width 0.3–0.4 mm; ovoid; whitish; chorion appearing finely pebbled. (Based on 38 eggs, dissected from five females having 6, 6, 8, 9, and 9 eggs, respectively.)

First larval instar.—Length 1.3–1.7 mm; maximum width 0.23–0.35 mm; 12-segmented; metapneustic; translucent to white; mouth parts black; dorsolateral

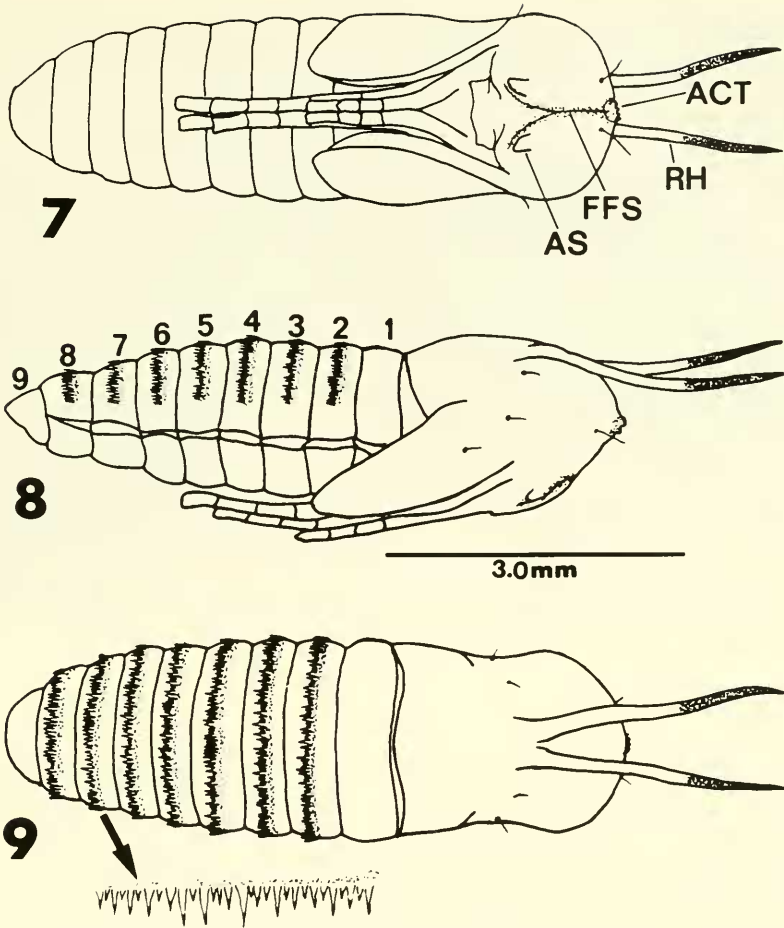


Figs. 3-6. *Pelastoneurus vagans*. 3, Larva, lateral view. 4, Posterior spiracular disc, segment 12, with enlarged hair tuft. 5, Larval mouth parts, dorsal view. 6, Same, lateral view. Abbreviations: (HS) hypopharyngeal sclerite. (LM) labrum. (MD) mandible. (MP) median plate. (MR) metacephalic rod. (TR) tentorial rod.

and ventrolateral lobes short, equal in length; posterior spiracles indistinct, located near tips of dorsoventral lobes. (Based on 2 larvae and 2 larval exuviae.)

Second larval instar.—Length 4.3–5.7 mm; maximum width 0.61–0.66 mm; 12-segmented; white; mouth parts black; amphineustic; anterior spiracles on segment 2; posterior spiracles on posterior spiracular disc of segment 12, blackish, borne near bases of dorsolateral lobes; dorsolateral lobes of segment 12 shorter than ventrolaterals. (Based on 2 larvae and 3 larval exuviae.)

Third larval instar (Fig. 3).—Length 9.6–10.3 mm; maximum width 1.5–1.7 mm; 12 segmented; whitish; mouth parts dark brown to black; body tapered anteriorly, truncate posteriorly; integument finely striate along lateral line and on venter; segment 1 retractile; body segments 4–11 with obvious ventral creeping



Figs. 7-9. *Pelastoneurus vagans*. 7, Pupa, ventral view. 8, Same, lateral view. 9, Same, dorsal view with enlargement of spinule row of 7th abdominal segment. Abbreviations: (ACT) apical cephalic tubercle. (AS) antennal sheath. (FFS) frontal facial suture. (RH) respiratory horn.

welts composed of transverse rows of minute setulae and recurved, triangular, cuticular protuberances. Amphineustic; anterior spiracles on segment 2, stalked, 0.03 mm long; posterior spiracles dark brown, located at bases of dorsolateral lobes, 0.49-0.53 mm apart, each 0.13-0.15 mm diam.; posterior spiracular disc of segment 12 (Fig. 4) with 6 projecting lobes, 2 dorsolateral, 2 very short lateral, and 2 ventrolateral; each dorsolateral lobe with 2 hair tufts, each tuft comprised of 8-12 hairs that appear to be widened basally; perianal pad on venter of segment 12 large, longitudinally rugose, ovoid in shape. (Based on 12 larvae.)

Larval mouth parts (Figs. 5, 6).—Labrum with acute tip, appears to curve ventrally near apex; arms of median piece project laterally, curve forward near tips; hypopharyngeal sclerite 0.65-0.71 mm long, caudal tip acute, amber; metacephalic rods broadly spatulate at caudal tips, curved laterally, 0.87-0.91 mm long; tentorial rods 0.70-0.75 mm long, caudal tips spatulate, slightly curved laterad, black. (Based on 3 head capsules.)

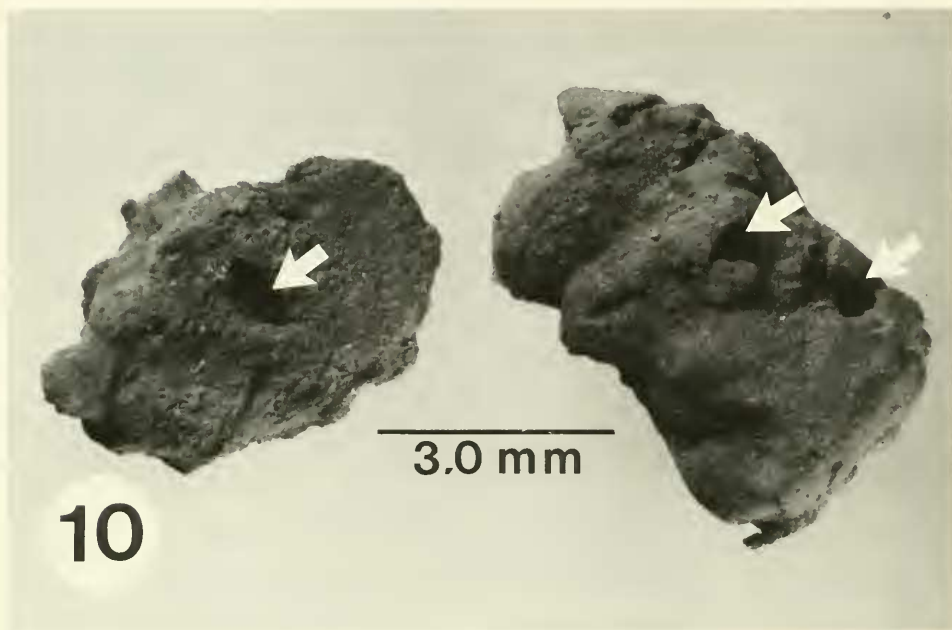


Fig. 10. *Pelastoneurus vagans*. 10, Pupal cocoons with emergence holes (arrows).

Pupa (Figs. 7, 8, 9).—Total length 4.9–5.2 mm from abdominal tip to apical cephalic tubercle; thorax in dorsal view 1.8–2.0 mm wide; prothoracic respiratory horns 1.7–1.9 mm long; body amber; sutures, tubercles, respiratory horn bases, and distal one-half of horns dark brown. Respiratory horns directed forward, slender, slightly curved, unsegmented, terminating in sharp points. Frontofacial sutures 0.70–0.75 mm long, resemble inverted “Y,” diverge below antennal sheaths; apical cephalic tubercles with four blunt points; a single seta 0.19–0.20 mm long on each side. Thoracic dorsum with three setae on each side of midline; pedothecae 1 reach posterior edge of first abdominal segment and pterothecae; pedothecae 2 reach posterior edge of fourth abdominal segment; pedothecae 3 reach edge of fifth abdominal segment. Abdomen 9-segmented, slightly curved, blunt posteriorly, dorsal surface of segments 2–8 with transverse spiniferous bands, each consisting of close-set row of brown spines directed posteriorly, increasing in size mesally. (Based on 3 intact pupae and 14 pupal exuviae.)

Cocoon (Fig. 10).—6.0–7.2 mm long; 4.2–4.8 mm wide; irregularly shaped; composed of fine soil particles; color dark chocolate brown when fresh; inner surface smooth; outer surface pebbled; adult emergence hole 1.5–2.1 mm diam. (Based on 14 cocoons.)

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